Wordscape

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Abstract

Wordscape is a learning environment where children can use physical play to interact with and control words, images and animations which are projected on walls or screens. The focus is on playing with words and letterforms. The Wordscape environment motivates children to develop their language and literacy skills. Children can explore, interact with, manipulate and control words individually or collaborate with others to make things happen. Sound and movement sensors pick up their interactions and trigger changes in typographical elements of the story, to make images appear, play music and sounds and get visual/sound clues about the meanings of specific words. Wordscape uses new technology alongside traditional methods (drawing, painting, playing) to reinforce children's literacy learning. Wordscape uses active and interactive physical play away from the computer screen, TV, white board or games console. It provides a fun space so that children including 'reluctant learners' will be motivated to return to it again and again, reinforcing their word skills and developing social skills. The environment can transform the way children learn by creating new learning spaces that are also play spaces. The focus, scale and physical interaction of Wordscape is new and exciting and we are continuing to develop the project and gather feedback from children to discover what is possible.

Keywords

Play, interact, physical, explore, learn, manipulate, control, collaborate

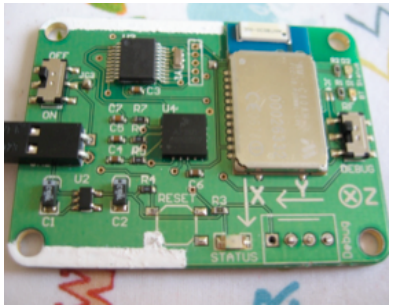

Figure 1. The circuit for the Wordscape project

Figure 2. Activating the interactive wrist cuff.

ACM Classification Keywords
Animations, user-centered design, human factors

Introduction

Wordscape explores the interface between physical play and language and literacy learning. It is free standing and transportable. Children wear a robust, wrist cuff device to control words, sounds and animations. The wrist cuff uses Bluetooth communication. The animation is written in Flash so that data coming from the sensor can be transformed into colour or speed change with acceleration in different directions. Currently a java application runs the Flash application to interpret the data coming from the microprocessor and passes the data to the Flash interface where the numeric variables trigger the appropriate changes.

Wordscape reinforces the teaching of phonics, alliteration (e.g. windy woosh weather), visual/sound clues and repetition. It uses new technology alongside traditional methods such as writing, drawing, mark making to assist, enable and motivate learners.

- Wordscape uses interactive digital technology in a healthy physical environment, exploring new technology via non-sedentary activity.
- It exploits the potential of interactive and wearable interfaces to create a new language and literacy learning environment.
- It uses a multi-sensory setting to reinforce learning and allow children to use imagination to add original, creative content.
- Wordscape encourages children to speak, listen, draw and write.
- Wordscape extends and develops the appeal and enduring success of traditional illustrated picture books. It expands and exploits these strengths in a large-scale digital context.
- It encourages dramatic and imaginative play in an adaptable, flexible and reactive learning location.
- It allows educational professionals to facilitate children's learning in a new way. Children can use physical activities to learn about negotiating and sharing ideas with others to solve problems, to build confidence and to make things happen.
- Wordscape makes learning fun.

User Group

Users include Main Stream and Special Needs Schools, Galleries/Museums, enabling the development of language and literacy acquisition in children at pre-school and KS1 (Key Stage 1), ESL (English as a Second Language) and assisting in the learning of another language.

Wordscape is a flexible system that can be tailored to meet individual user needs. For example it can be adapted to respond to a child's most reliable physical movement i.e. head movements or hand clapping.

The early system was tested with a group of eight children in September 2007 at the University of Ulster, Belfast. They began with a drawing and writing session exploring words and language relating to the weather. They worked together using phonic sounds to help spell out and draw key words such as 'wet, cloudy, sun, woosh, pitter, patter…'. The children scanned the

Figure 3. The wrist cuff with Velcro fastenings and printed graphics.

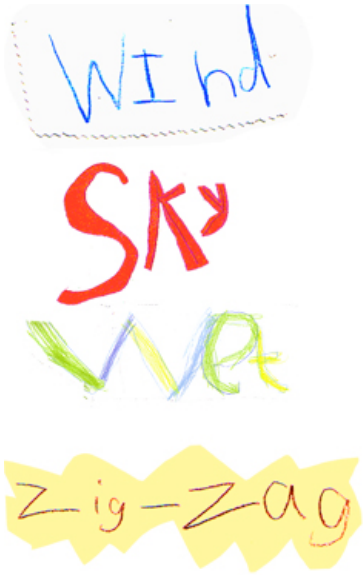

Figure 4. Children add their own words and drawing to the Wordscape environment.

words, letterforms and drawings and we inserted them into the animated environment. They were excited to see their own work in the projected environment. They played together e.g. counting how many times they needed to swirl their arms to make the wind blow and see words appear. In this test group the children's interaction with the animated environment was very physical, collaborative and vocal and therefore unlike many existing interactive tools. We devised feedback questionnaires and discussed the workshop experience with children, parents and carers. Children's feedback included the folowing:

They liked '…the letters and words', '…painting and drawing', 'I liked counting the raindrops', '…the thunder', 'I liked all of the things.'

They did not like '…wind because a loud sound.'

We could make better 'More weather to play with', 'Different weather', 'Cars', 'More gloves', 'More paint', 'Couldn't make it better.'

Although there are numerous devices (such as whiteboards, desktop/laptop computers, hand-held systems/games consoles) that address specific educational issues, we have not found another system that uses the focus, scale and physical interaction of Wordscape. Other sytems such as the 'Nintendo Wii' use wireless technology but do not focus on words, language or literacy. The Wordscape system is flexible and can be tailored to meet an individual's learning and physical needs.

A technology aid for speech sound learning described in the RCSLT (Royal College of speech and Language Therapists) Bulletin, November 2007 uses non-physical interaction and is typical of available products. Currently there are excellent interactive, educational and non-physical projects being researched such those as at Cambridge Hitachi by Pie Corbett, by John Maeda and researchers at MIT (Massachusetts Institute of Technology) and at Futurelab, Bristol.

The large scale of the Wordscape environment provides more opportunities for children with differing skills to learn with, and from, each other in groups. It provides more opportunities for parents, carers and educators to engage with children and does not rely on sedentary activity. Wordscape extends classroom use of four interdependent language strands: speaking, listening, reading and writing, in a physical play context. Children are able to add to, shape and control the play environment.

In Development

We will use the 'Wordscape 2' workshop, Summer 2008 to gather feedback from children, parents and educationalists. This will help us to identify and evaluate the strengths and weaknesses of the updated system. We are continuing to liaise with language and literacy, special needs and speech and language professionals on integration of phonics, alliteration, visual clues and repetition. We are developing the use of graphics and animated letterforms in Wordscape and exploring how they link with language and learning methods. Further sourcing, recording and integration of sound relating to phonics will enable children to use play to practice appropriate sound/word associations. We are exploring ways to make the wearable wrist cuff device more appropriate to the user group – building on the current wireless system and using accelerometers for multidirectional input. Would two or more cuffs increase opportunities for collaborative play? Is the system age appropriate?

Figure 5. Children wave their arms to make the flowers grow and the sun disappear.

Figure 6. Children control the wind.

Which are the most effective methods for data collection and evaluation of the prototype? What are the most appropriate methods for recording target workshops (photographic, digital video, questionnaire, discussion…)? We are continuing to develop and refine the wrist cuff's technical components including the use of accelerometers (to sense movement, i.e. waving arms), microphones (to detect sounds, i.e. shouts), pressure sensors (to detect impacts, i.e. clapping hands), using Bluetooth technology to allow wireless transmission to computer, a micro-controller (to analyse data), lightweight rechargeable batteries, durable and washable textiles and printing of graphics. During the testing of the prototype children were able to add their own drawings, writing, letterforms, mark making… (which they loved) and we aim to develop the system so that this process is faster and more efficient.

Figure 7. Testing the Wordscape system.

Acknowledgements

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